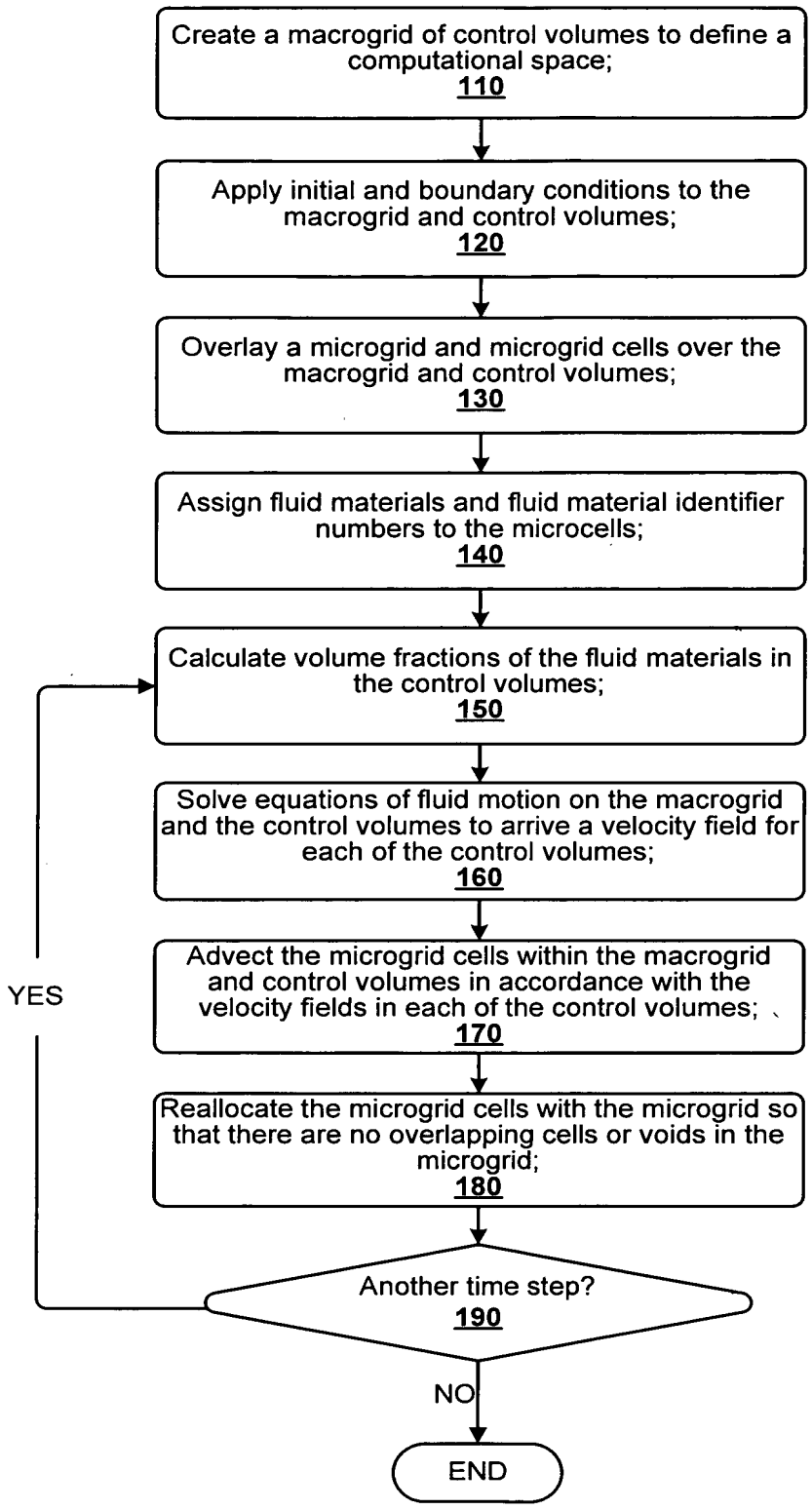

Create a macrogrid of control volumes to define a computational space;
110
Apply initial and boundary conditions to the macrogrid and control volumes;
120
Overlay a microgrid and microgrid cells over the macrogrid and control volumes;
130
Assign fluid materials and fluid material identifier numbers to the microcells;
140
Calculate volume fractions of the fluid materials in the control volumes;
150
Solve equations of fluid motion on the macrogrid and the control volumes to arrive a velocity field for each of the control volumes;
160
Advect the microgrid cells within the macrogrid and control volumes in accordance with the velocity fields in each of the control volumes;
170
Reallocate the microgrid cells with the microgrid so that there are no overlapping cells or voids in the microgrid;
180
Another time step?
190
YES
NO
END

FIG. 1

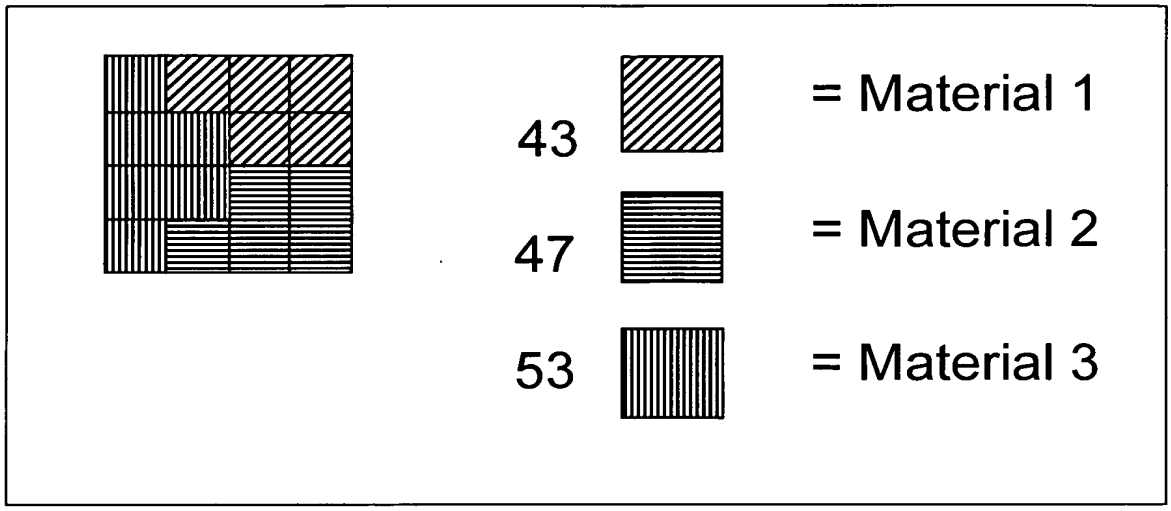
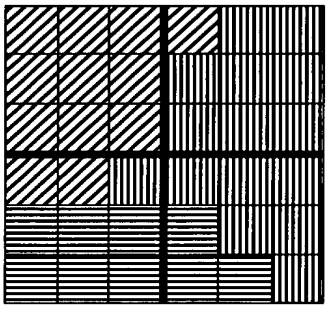


FIG. 2

(3A)

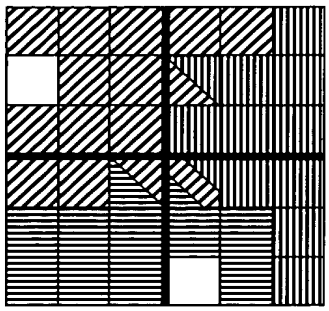


(3B) Numerical representation

43	43	43	43	53	53
43	43	43	53	53	53
43	43	43	53	53	53
43	43	53	53	53	53
47	47	47	47	53	53
47	47	47	47	47	53

FIG. 3

(4A)



(4B) Numerical representation

43	43	43	43	43	53
1	43	43	2279	53	53
43	43	43	53	53	53
43	43	2021	107113	53	53
47	47	47	47	47	53
47	47	47	1	47	53

FIG. 4

(5A)

		X			X
X		X		X	
	X	X	X		
X	X	S	X	X	X
	X	X	X		
X		X		X	

(5B)

O		X	O		X
X	O	X	O	X	O
	X	X	O	O	
O	O	X	S	O	O
	X	X	O	O	
X	O	X	O	X	O

FIG. 5

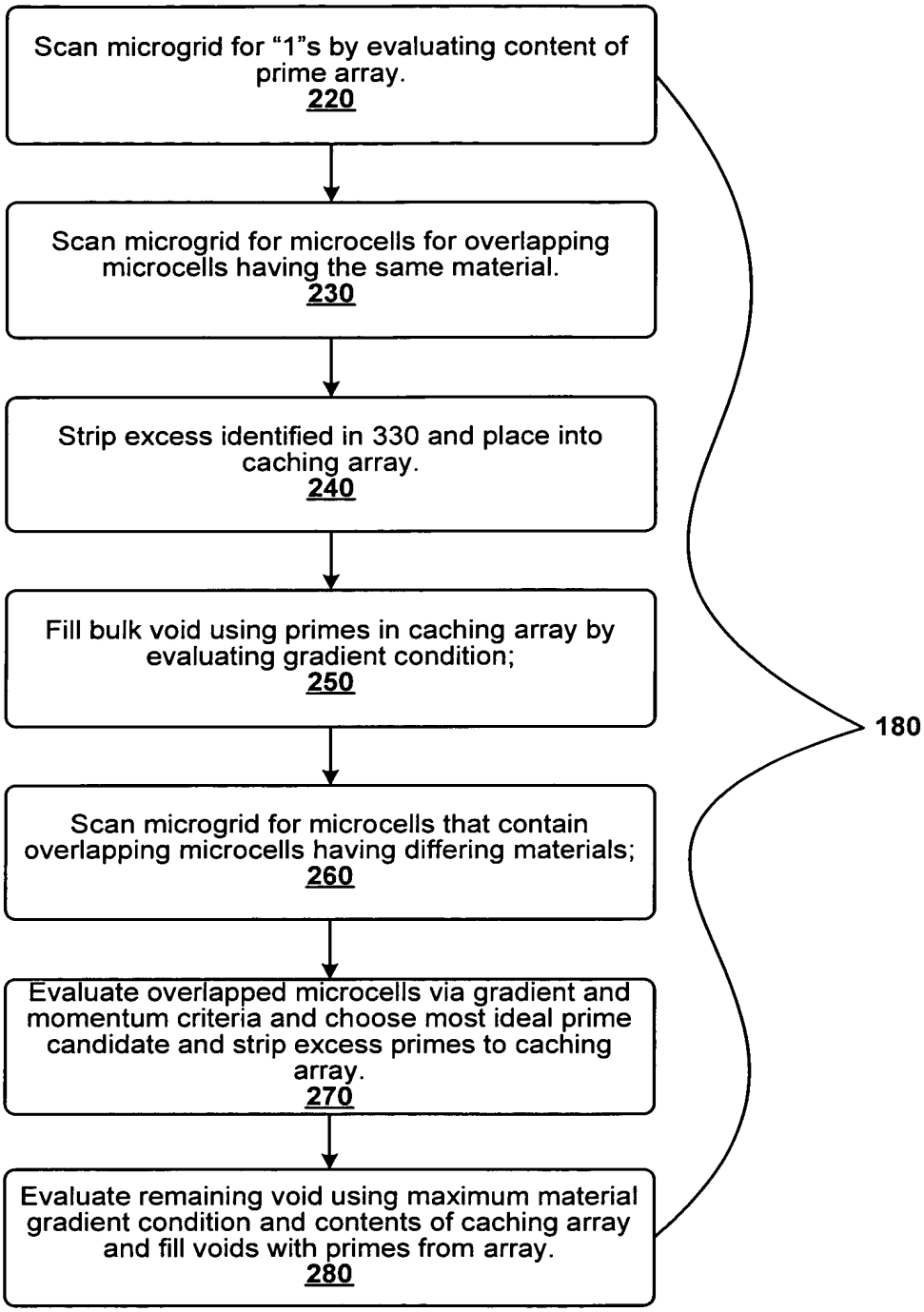

Scan microgrid for "1"s by evaluating content of prime array.
220
Scan microgrid for microcells for overlapping microcells having the same material.
230
Strip excess identified in 330 and place into caching array.
240
Fill bulk void using primes in caching array by evaluating gradient condition;
250
Scan microgrid for microcells that contain overlapping microcells having differing materials;
260
Evaluate overlapped microcells via gradient and momentum criteria and choose most ideal prime candidate and strip excess primes to caching array.
270
Evaluate remaining void using maximum material gradient condition and contents of caching array and fill voids with primes from array.
280
180

FIG. 6

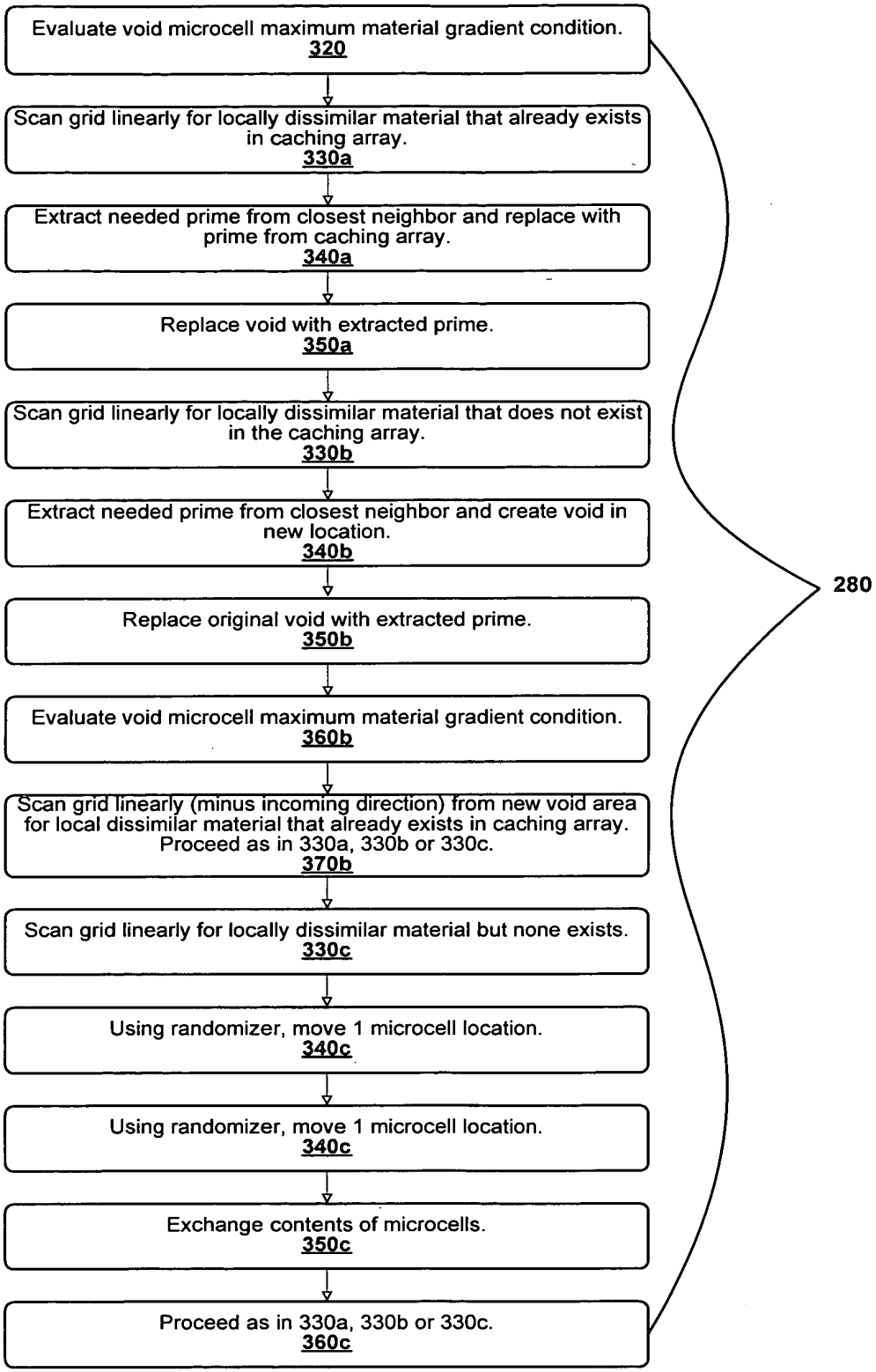
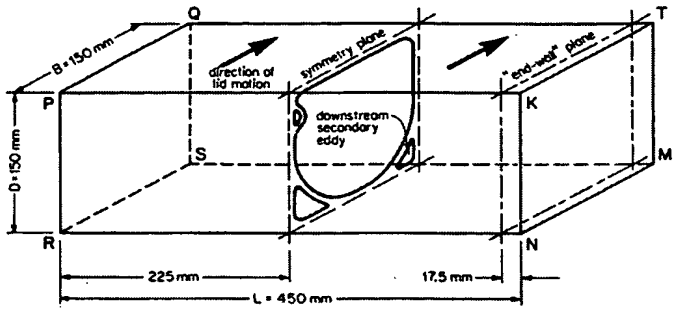

Evaluate void microcell maximum material gradient condition.
320
Scan grid linearly for locally dissimilar material that already exists in caching array.
330a
Extract needed prime from closest neighbor and replace with prime from caching array.
340a
Replace void with extracted prime.
350a
Scan grid linearly for locally dissimilar material that does not exist in the caching array.
330b
Extract needed prime from closest neighbor and create void in new location.
340b
Replace original void with extracted prime.
350b
Evaluate void microcell maximum material gradient condition.
360b
Scan grid linearly (minus incoming direction) from new void area for local dissimilar material that already exists in caching array. Proceed as in 330a, 330b or 330c.
370b
Scan grid linearly for locally dissimilar material but none exists.
330c
Using randomizer, move 1 microcell location.
340c
Using randomizer, move 1 microcell location.
340c
Exchange contents of microcells.
350c
Proceed as in 330a, 330b or 330c.
360c
280

FIG. 7



BOUNDARY DEFINITIONS

END-WALL : POSR
: KTMN

SIDE-WALL UPSTREAM : PKNR
DOWNSTREAM : QTMS

LID : PQTK

LOWER HORIZ. : SMNR

FIG. 8

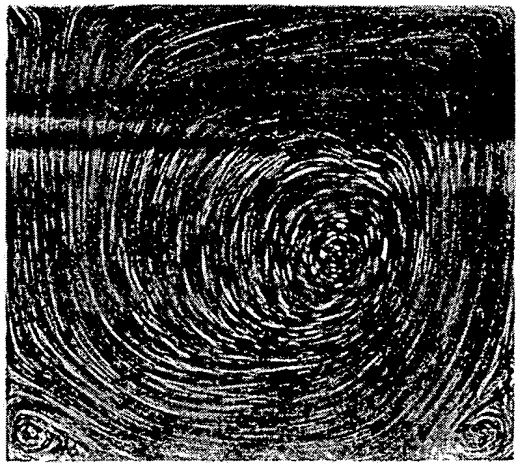


FIG. 9

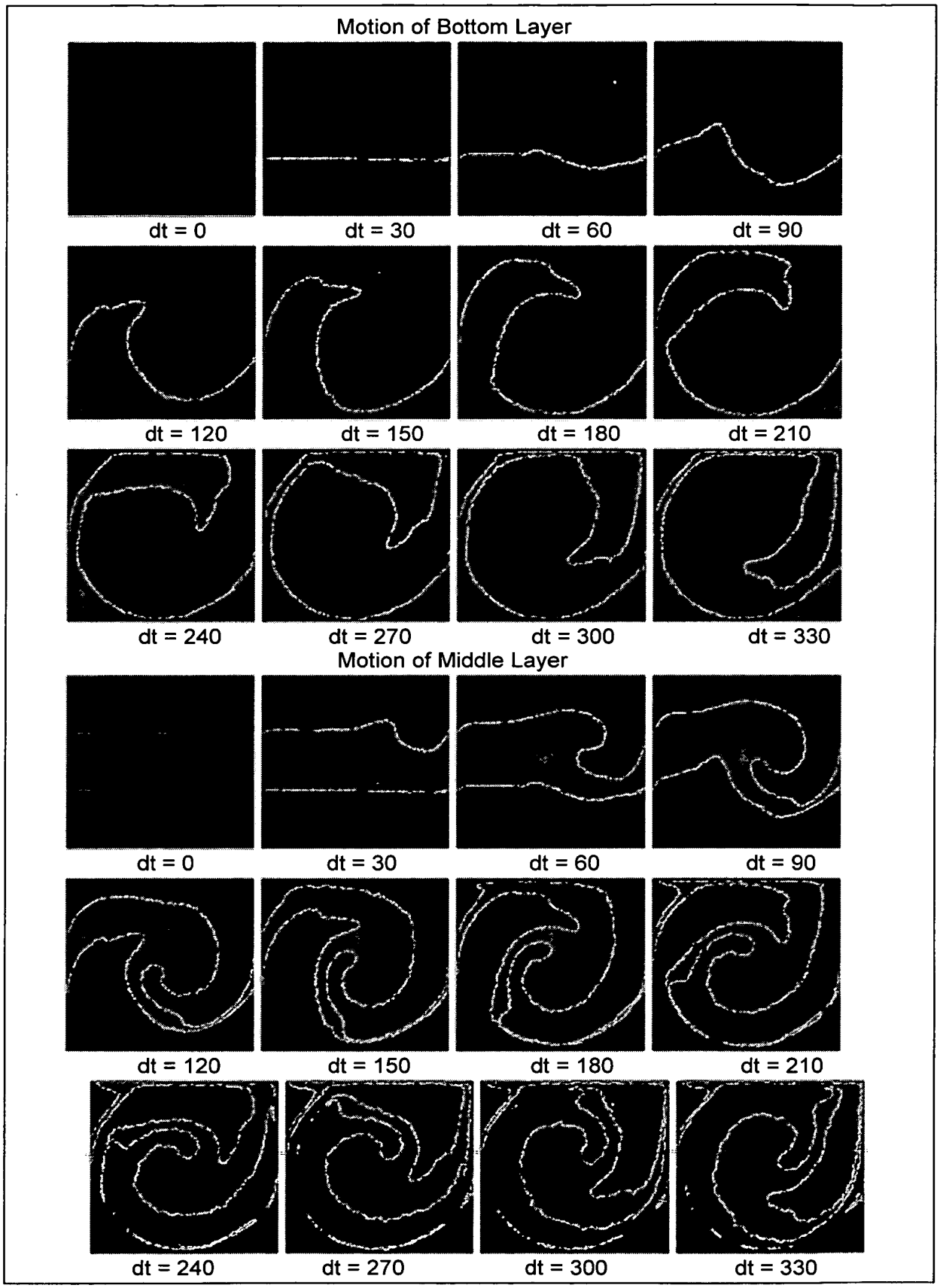


FIG. 10A

BEST AVAILABLE COPY

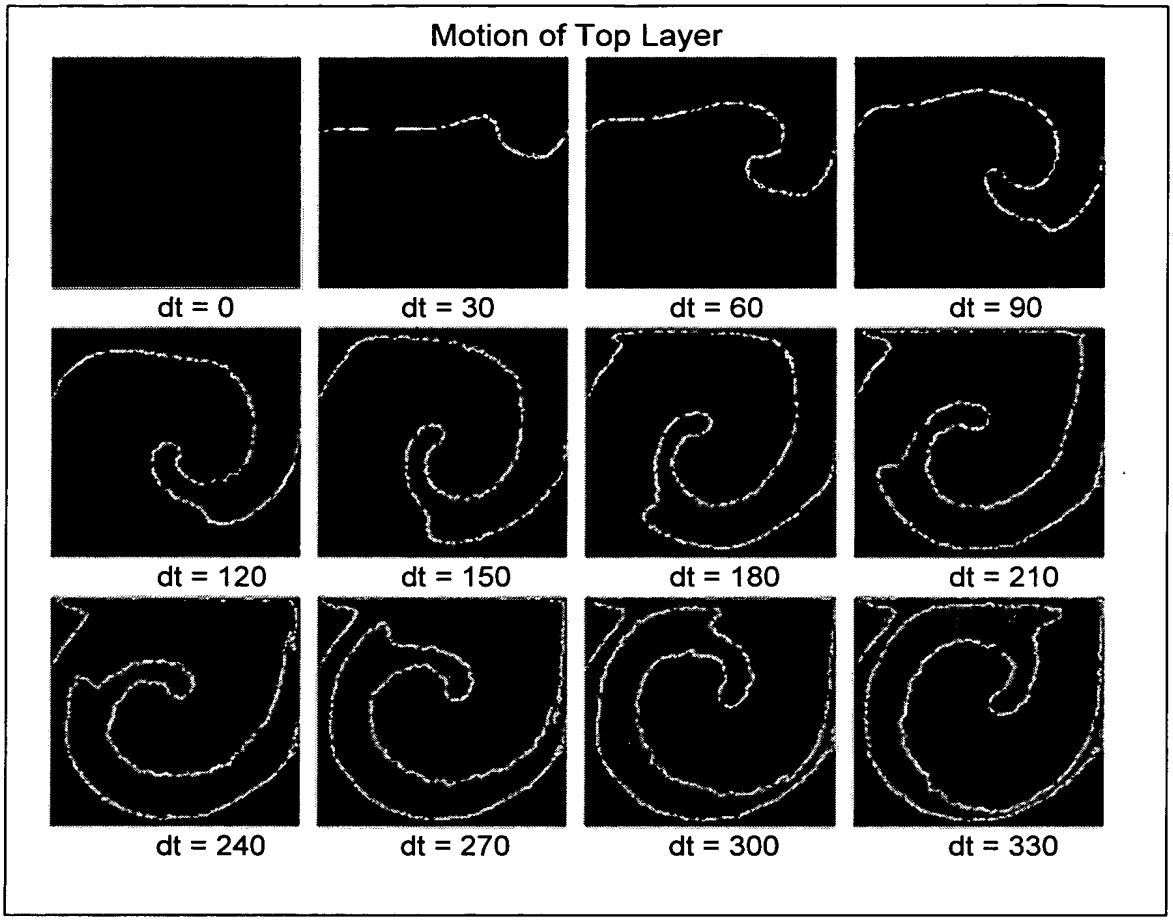


FIG. 10B

BEST AVAILABLE COPY

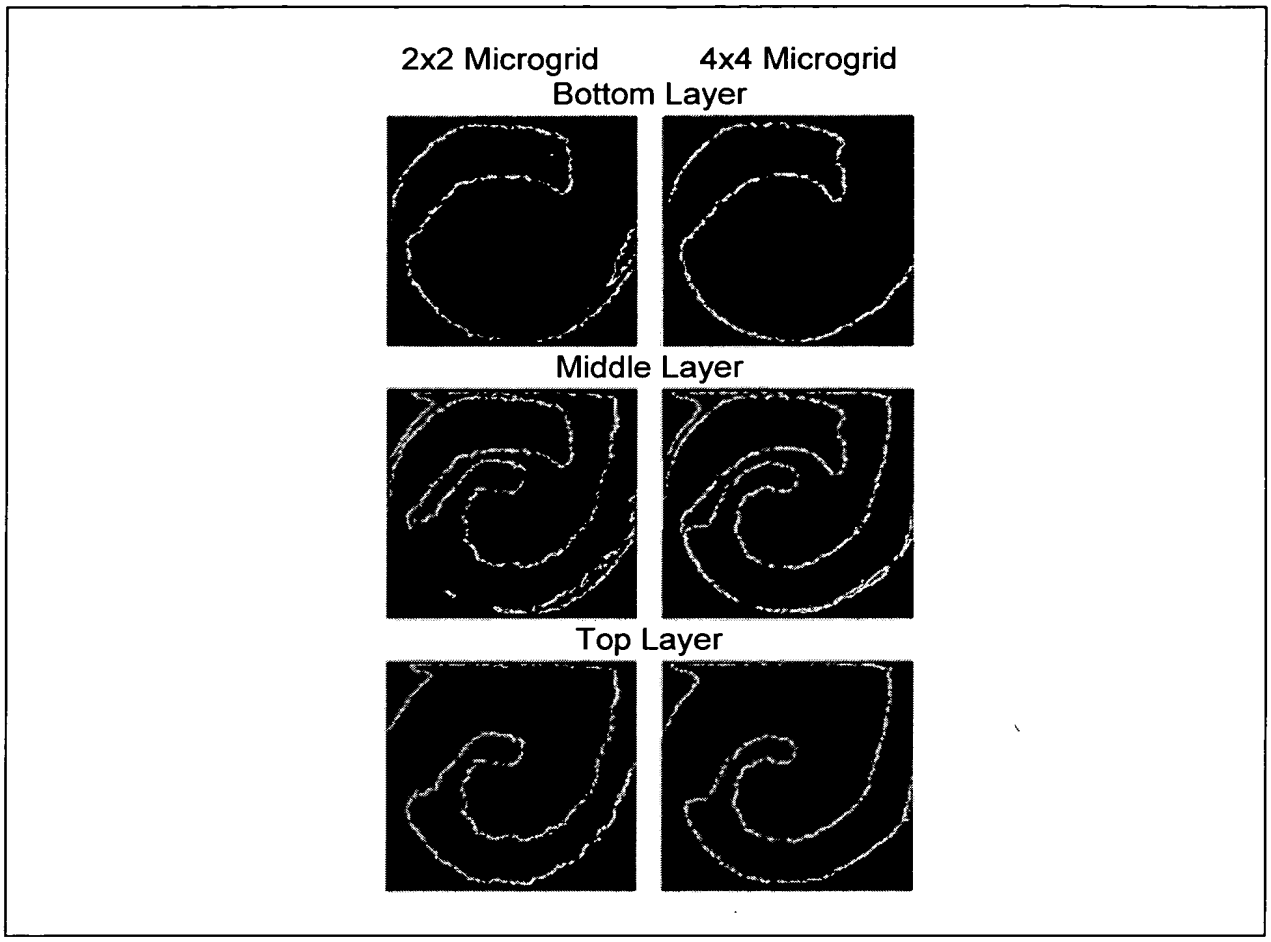


FIG. 11

BEST AVAILABLE COPY

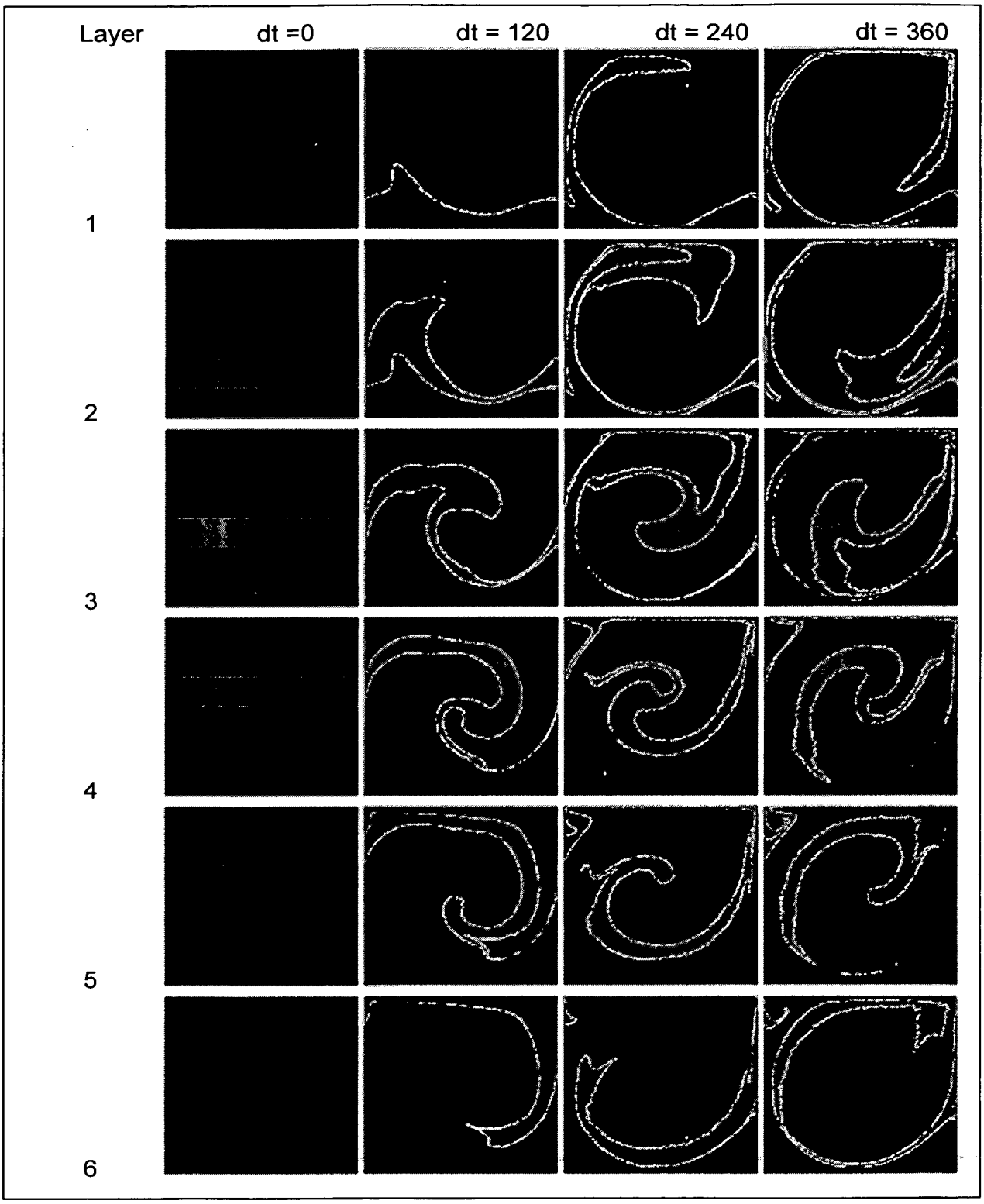


FIG. 12

BEST AVAILABLE COPY

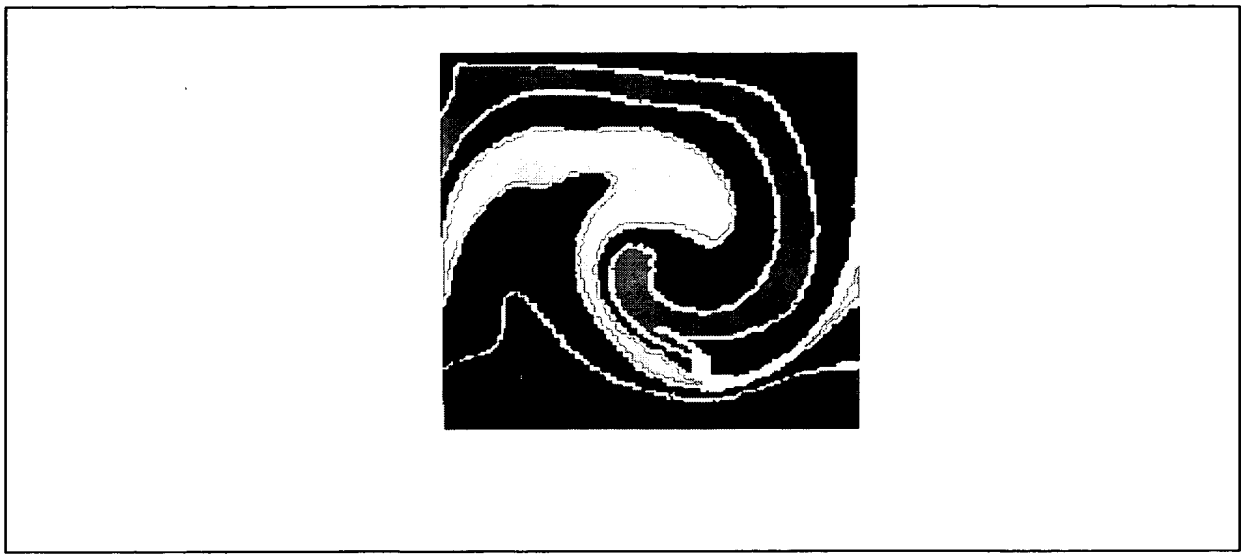


FIG. 13